



2016 Ingenious awardees

Structurally Found

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Amount awarded: £3,000

Structurally Found is an engineer-themed scavenger hunt which takes place around London during Open House weekend. Participants download a hitlist of engineering elements (dome, cantilever etc.) to look out for as they are out and about in London. Once spotted (e.g. the dome of St Pauls) they simply photograph it and tweet/instagram it tagging the engineering element. Correctly tagged entries are entered into a draw to win prizes. But Structurally Found is more than a competition, it is a conversation. Once a participant sends us a photo and we have an engineer ready on twitter to send them back an interesting engineering fact or maybe even a clue as to where to find another element, creating a giant engineering conversation online.

Kate Bellingham Ltd

School Gate SET - Primary school parents supporting STEM

Amount awarded: £29,460

This project aims to create a community of engineers who are on or have had a career break and have time and enthusiasm to become embedded STEM Ambassadors in a primary school.

'When STEM' (IMechE/RAEng 2010) emphasised the importance of engaging with primary school children. However, anecdotal evidence from the Science Sisters project and WES suggests career break women may lose confidence and often cannot see how they can contribute their technical expertise. This project will recruit 40 engineers in two UK regions, and give face-to face and online training to build confidence and develop expertise to deliver a number of existing STEM activities. The schools will gain an embedded STEM Ambassador, while the parent develops skills and awareness of opportunities as a 'returner'. Case studies of the participants' experience will be shared with the online School Gate SET community, while media coverage will help grow the network.

Talyllyn Holdings Limited & Narrow Gauge Railway Museum

Learning from the Past, Engineering the Future

Amount awarded: £7,575.24

Learning from the Past, Engineering the Future is an exciting engagement project delivered amongst the engineering artefacts of the Narrow Gauge Railway Museum and on the inspirational steam trains of the Talyllyn Railway in the Fathew valley, Wales. Comprising two main elements, school events delivered on-site and informal public engagement sessions delivered during the peak running season of the railway,

the project engages schools and families with engineering while supporting engineers through training and practical experience during their public engagement journey.

The Talylyn Railway and Narrow Gauge Railway Museum have a wealth of engineers within their staff and volunteer workforce which is not always apparent to the railway's passengers and visitors. By engaging these engineers with different publics the project will inspire children and adults alike, reflecting the vibrant work that engineers do through hands-on activities, investigations and informal conversations.

The Making Place

Making Place Engineering Kits

Amount awarded: £10,247

This Making Place project will work with a group of engineers and industrial designers to develop some of the charity's successful workshop (classroom) based introductory engineering activities into a range of stand-alone kits in order to reach a wider audience: by selling the kits at minimum cost online and by engaging the public at music festivals in creative hand-built engineering projects at the Making Place.

The project will also encourage engineers to develop their communication skills by volunteering on the Making Place stand at Glastonbury Festival of Performing Arts, Small World Solar Powered Festival, Chilled in a Field, Green Gathering and Solarafayre where they will be able to share their skills, passion & expertise for engineering when engaging the public in constructing the kits and thus help to raise greater awareness of and interest in the diversity, nature and impact of engineering in daily life and the world at large.

University of Bath

Buskineers: Bath engineers perform their research on the street.

Amount awarded: £3,460

Buskineers is a project aimed at developing a team of engineering postgraduate students and researchers. We want to take them from academic speakers to eloquent street performers capable of delivering entertaining performances about their area of research on the streets of Bath, busking style!

The University of Bath engineering department currently hosts a wide variety of fascinating research: ranging from sustainable energy, to biomedical applications, sensors and construction materials. However, the opportunity to engage the wider public audience with this research, in unique, creative and entertaining ways, is yet to be fully realised in Bath.

In addition to increasing awareness and creating a dialogue around engineering research carried out at Bath University, this project aims to provide a platform to enhance the communication, creativity and outreach skills of engineering researchers- where such long lasting skills will not only be applicable to public

engagement activities, but also to academic activities too.

Steve Cross

Engineering Showoff - chaotic cabaret about making the world

Amount awarded: £10,500

Engineering Showoff builds on and expands the longstanding Science Showoff concept (www.scienceshowoff.org) which over the last four years has seen over 500 people take to the stage and communicate science in loads of different ways. We'll take groups of engineers, covering industry and academia and lots of different employers, from four cities and train them up to be accomplished performers. We'll then unleash them onto the stage at evening events for adults, to entertain public audiences for nine minutes each. We'll video and photograph each gig and create a permanent record of engineers revealing what they do, and how they make the world the way it is, in the most entertaining way possible. It'll be part comedy, part storytelling, part demonstration and all fun.

Ulster University

Securing Tomorrow's World: Best practice in staying secure online

Amount Awarded: £30,000

Securing Tomorrows World builds on Ulster's well-established STEM outreach activities to create a long-lasting cost-effective model to train degree-qualified academic & industrial engineers in the art of inspiring students to follow an engineering career. This will take place through inspirational, practical-based demonstrations, focused on network security engineering, that will serve to enthuse school students. These practicals will be aligned to the appropriate syllabi so as to ensure the schools become actively involved.

In parallel, we will train engineers in engaging with primary, GCSE and A-Level students. Engineers from across the region will be recruited to take part in the project and we will film case studies capturing their passion for engineering, which will be incorporated into our workshops and used to create an online interactive resource. Finally, a series of public engagement events will be performed to students, with the aim both of increasing their academic understanding and inspiring the next generation of engineers.

University of Glasgow

Electronic Touch (ET)

Amount awarded: £10,400

Electronic touch is a new scheme which sees engineers of different career stages provided with the training and opportunity to share cutting edge research with groups outside of the research environment. The University of Glasgow is doing internationally recognised work in the field of tactile interfaces and despite these being ubiquitously used today there is very little understanding of how they work or of the underlying engineering concepts involved. Electronic Touch will bring these to

life through interaction, experimentation and play. Engineers will have in-depth engagement training before applying their new skills learnt in a classroom setting. They will take the newly developed touch interface to schools and demonstrate how they work. Pupils will benefit from gaining insight into the working of touch interfaces while engineers will gain valuable experience in engagement but also be able to gather thoughts, opinions and data about how people interact with these devices.

The University of Manchester

Knead for Speed: Aero Challenge

Amount awarded: £16,450

Computational aerodynamics plays a significant role in modern day engineering of vehicles and offers insight into physics difficult or expensive to obtain using traditional testing methods. Communicating aerodynamics with words or equations alone can be challenging and so this project aims to create an immersive experience to stimulate, surprise, enthuse and educate students and the general public alike. We will use computer modelling of air flow together with augmented reality to explore the air flow around 3D shapes prepared by the participants using plasticine. In the Knead for Speed: Aero Challenge teams of pupils will model a series of 3D shapes representing cars, trains, trucks and planes. We will provide cutting-edge 3D scanning and real-time simulation software to simulate and visualise airflow over these vehicles. Pupils can experiment 'live' with different designs and gain intuitive and exciting insight into aerodynamics through an innovative 'learn through play' interactive experience.

Refinery Productions Ltd

Survival Village @SMASHfestUK: a festival bringing engineering to new audiences

Amount awarded: £29,878

Survival Village is the engineering centre of a new festival, (www.SMASHfestUK.com) which has been explicitly designed to increase diversity and widen participation in STEM. SMASHfestUK was successfully piloted in February 2015 in Deptford, London where the Survival Village was the centrepiece of the narrative ("ASTEROID STRIKE: LONDON"). Children and families attending the festival attendees were invited to discuss what a future Deptford might look like, thinking about what amenities they would need (water, sanitation, building materials). Audiences were invited to build structures using basic engineering principles in the garden of the Albany Theatre, SE8. Using a narrative-driven and inquiry lead model of engagement with Survival Village, we have shown that we are able to engage diverse, underserved audiences. With funding for 2017 we will further develop the Survival Village concept to return to Deptford in 2017, and take it to new audiences in two new London Boroughs in areas of similar socio-economic need.

University of Southampton

The Macroscope: A lens at the World Wide Web

Amount awarded: £29,841

The Web reaches almost half the population of the planet. It has developed from a document sharing system to a highly dynamic space in which information is shared at very high speed, generating vast quantities of data about the activities of 3 billion people worldwide.

These data are very promising but it is increasingly recognised that we have to develop a new “ethics of care” for data analytics. This project aims to lead the way in developing these “situational ethics” by engaging the public in the development of a web data ‘Macroscope’.

A prototype Macroscope has been built by software engineers at the University of Southampton to provide a lens on multiple streams of real-time Web data. It now needs to move to the next step: communicating to the public the data that that can be analysed and displayed; discussing public responses, views and concerns; and developing the Macroscope accordingly.

Rusty Squid

Heart in your Hands

Amount awarded: £29,995

The human heart is a biological feat of engineering, responsible for pumping blood through an individual’s body over a lifetime. Transporting enough blood volume to fill over 200 Olympic size swimming pools, the mechanical function of the heart is highly coordinated, robust and designed to endure. The Heart in your Hands project is an opportunity for the public to literally hold in their hands a beautifully designed beating heart, and in so doing, inspire a deeper appreciation of the biomedical engineering behind the human heart. Using soft robotics, this project will develop a series of hearts, mimicking the structure and function of the normal and diseased heart. Merging the engineering design expertise of Rusty Squid studios with biomechanical models engineered for heart research at King’s College London, these novel, interactive devices will give visitors a hands-on view of how the heart works and adapts in disease.

Gallomanor Communications

I’m an Engineer - Online STEM engagement for schools

Amount awarded: £29,890

I’m an Engineer is a tried and tested STEM education activity where school students and engineers meet and interact. Students challenge engineers over fast-paced online live CHATs. They ask them anything they want, and vote for their favourite engineer to win £500 to be spent on further public engagement.

169 engineers and 260 teachers signed up to take part in I’m an Engineer last year. We want to help meet demand, increase the diversity of engineers taking part, incorporate corporate funding streams, and continue with the comprehensive evaluation of the project. Being online we can reach remote schools not well served

by current STEM outreach activities. We will target these remote Widening Participation schools and help get their students enthused about STEM careers. The project has a positive effect on students' attitudes and understanding of the diversity, nature and impact of engineering.

Techniquest, Cardiff

Qualified for Life -Focus on Engineering

Amount awarded: £9,320

Techniquest is a science centre in Wales with a track record of successful public and schools engagement with STEM subjects. Techniquest's mission is to engage its audiences and to encourage them to learn more, particularly in relation to inspiring the young people in Wales to gain skills and qualifications relevant for the world of work, and to become the next generation of engineers.

This project will reach 2,000 11-16 year old students who will participate in free workshops that showcase how STEM skills are essential. Engineers will be recruited as role models and trained to assist in the delivery of the workshops, to provide an insight into their jobs, and to stress the importance of STEM skills in the workplace.

Telegraph Museum Porthcurno

Hard Wired World: Fibre Optic Communication and You

Amount awarded: £27,881.06

Housed in original telegraph buildings and wartime tunnels, Telegraph Museum Porthcurno tells the extraordinary story of the engineers who designed, created and maintained a hidden communications network of undersea cables. From 1870 these cables connected Britain with the world, and at its peak fourteen telegraph cables ran under Porthcurno's sandy beach. Now there are four fibre-optic cables, equally hidden and little understood by the public, which form part of the modern global communications network. This project will involve engineers from industry and academia working with our audiences to develop light-based interactive exhibits which will be integrated into a new exhibition on fibre-optic communication. The interactives and exhibition together will allow visitors to explore the science and engineering behind how we live our modern connected lives. Developing skills and confidence in engaging with the public directly, the engineers will also learn to engage the public through accessible and fun exhibit design.

Techniquest Glyndwr

Let's go on an Engineering Adventure in North Wales

Amount awarded: £29,960.89

'Let's Go on an Engineering Adventure' is a programme of events for the community of North Wales with the aim of engaging the public through activities led by local engineers and inspiring them to think about the relevance of engineering, especially linked to adventure, locally.

Engineers involved in the project will benefit from bespoke support, information and training from Techniquest Glyndwr to enhance their confidence and ability to engage

the public with engineering. New workshops will be developed and trialled during the project through collaboration between Techniquiest Glyndwr and engineers in academia and industry. Techniquiest Glyndwr will provide expertise in public engagement and workshop development, while the engineers will ensure content is accurate and relevant.

Over the course of the project, two events for female school students, four events for the community and 20 days of workshops run at local events will enable over 4,000 people to engage with the engineers.

Science Museum

Robots Pop-up Workspace

Amount awarded: £29,734.40

This project will see the Science Museum work closely with sixteen engineers to develop a range of interactive events that explore the cutting-edge engineering behind contemporary robotics. Timed to coincide with the opening of 'You, Robot', the Science Museum's blockbuster 2017 temporary exhibition, the project will involve a mixture of pop-up workspaces and live dialogue events.

Engineers will be on gallery to share their expertise with the public, exploring the social impact of their work. Visitors will meet engineers who work in the field of robotics to learn how contemporary engineering influences and shapes our lives now and in the future. They will benefit from lively conversation with experts as well as interactive experiences.

Participating engineers will be given the training necessary to develop public events and present to a lay audience, gaining an exclusive insight into how science and engineering are communicated within the Museum.

Arcola Energy

Wales & Humberside Schools Hydrogen Challenge

Amount awarded: £30,000

The Wales & Humberside Schools Hydrogen Challenge is a programme of workshops to be delivered across schools in Wales and Humberside, two regions that have put sustainability at the forefront of their development. The workshops engage young people in practical science that directly affects them and their environment, and explore the science behind renewable technology in a fun and tangible way.

Secondary school students will be challenged to design, build and test their very own hydrogen powered vehicle, and primary school students will work as a team to take aerial photographs with a hydrogen powered Raspberry Pi and a hydrogen balloon. We plan to deliver these innovative workshops to 3,600 young people across Wales and Humberside, employing engineers and science communicators from the local region to facilitate the work.

University of Edinburgh

eTunes: Building your own Electro-acoustic Guitar Workshop Series

Amount awarded: £9,844

Do you have the passion for music and a hunger to make your own? Well, here's your chance to harmonise your skills and engineer some beautiful music! This weekend workshop series walks participants through the process of designing and building an electro-acoustic guitar, amplifier and speaker system. Participants will work together in groups with engineers to learn basic acoustic, circuit design and electromagnetic theory and apply it to a practical project that they can take home. Do you have what it takes to be the ultimate guitar hero? Come join us and find out! The course ends with a public demonstration where engineers and musicians explain and use the instruments. The course is open to complete beginners.

ACTIVITIES:

Workshop 1: An acoustic guitar (2 days)

Workshop 2: An amplifier (2 days)

Workshop 3: A speaker + cabinet and pickups (1 day)

Public demonstration: Participants (specifically engineers) show work to community (1 day)

Science Oxford

Student Engineering Ambassador Programme

Amount awarded: £25,110

Oxfordshire lies at the heart of a thriving STEM economy with a demand for skilled engineers. This project aims to link selected students with local companies to engage, inspire and inform them about engineering careers in their local area. Matthew Arnold School will host an in-school Engineering Day for year nine students and will then select 20 Student Ambassadors who will work with engineers from five local companies on practical engineering projects. Engineers will receive training and support to devise a suitable project based on their core business and will host three half day visits for students to discuss progress and seek advice. Student Ambassadors will showcase their projects at a celebration and other school events to inspire other students and to disseminate learning. Once established, The Engineering Ambassador Programme will continue with future year groups with the potential to roll out to other Oxfordshire schools.

Modus

Foundation for Jobs

Amount awarded: £25,000

Foundation for Jobs (FFJ) is a national award winning youth project running throughout Darlington. It is delivered in partnership with local schools, The Northern Echo regional newspaper, Darlington Borough Council and most importantly the Darlington business community. FFJ aims to tackle Darlington's extremely high NEET figure, the 14th highest figure nationally, by raising aspirations that will improve the job prospects of Darlington's young people. This Ingenious Award will allow us to work with local engineering businesses to develop and deliver a range of activities that will inspire, stimulate and raise awareness of engineering as a career, create positive perceptions of the work and opportunities in the sector and address the current local and national skills gap by encouraging more of Darlington's young

people to study STEM subjects at a higher level, providing them with the right pathways, expectations and prospects.

University of Liverpool

Particle accelerator engineering workshops for schools

Amount awarded: £15,400

The importance of accelerators is shown through heavy investment in world-leading facilities such as the upgrade of the Large Hadron Collider (LHC) at CERN, Switzerland. Closer to market there is a growing need for accelerators for applications in security, healthcare, the food industry and environmental issues and so there are many opportunities for engineering careers in this field.

The aim of this initiative is to provide an opportunity for pre-sixth form pupils to get a taste of hands-on practical engineering by building machines related to particle accelerators in small teams supervised by researchers from the field. Resources will be developed in the form of 'how to...' worksheets which will be complemented by accessible videos made available via public web sites. In this way the technical principles often demonstrated in schools will be harnessed to enable working machines to be constructed and engage the pupils in engineering.

Imperial College London

Imperial College London - Stemettes Hackathon

Amount awarded: £5,000

The all-girl Hackathon pilots a weekend event for 50 young women supported by academics from Imperial College London and the Stemettes. The Stemettes have a track record of STEM events reaching 4,000 young women since 2013.

The Hackathon will get girls learning real programming techniques and coding an app, game or website. The weekend on Imperial's campus will include engineering-themed icebreakers, training and knowledge-building exercises. Faculty of Engineering (FoE) researchers, students and app-designers will be 'hack-hosts' teaching girls to achieve a tangible take-home result that can be used by family and friends. The girls will present their deliverables to judges. The Hackathon contributes to British Science Association CREST Discovery Awards, which we emphasise as a

'follow-up' on their weekend's success.

Hack-hosts will be primed to discuss STEM futures alongside providing technical tuition, which count towards Associate Fellowship of the Higher Education Academy under Imperial's STAR scheme.